Mechanical Charecterization Of hybrid composite of biwooven , glass epoxy fibre and sisal jute

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Abstract

The goal of the current effort was to investigate how glass fibres and natural fibres could be combined for use in the aerospace and marine industries. The mechanical characteristics of hybrid glass/jute fibre reinforced epoxy composites in the shapes of lamina and laminates were assessed using tensile, impact, and flexural tests. In comparison to laminas made using glass mat, the lamina generated with natural fibre mat displayed worse mechanical properties. For this reason, we suggested using a hybrid design for the various applications that uses jute fibre mats and glass woven fabrics. Comparing this design to the present commercial solution resulted in a cost savings of 20% and a weight reduction of 23%. Hand lay-up in a mould was used to create laminates, which were then cured.

Keywords: Hybrid composite, Mechanical properties, hand lay-up.

1. Introduction

Natural fibers exhibit many advantageous properties as reinforcement for composites. They are low-density materials, yielding relatively light weight composite with high specificproperties (Dweib et al., 2004; Rana et al., 2003). Natural fibers also offer significant cost advantages and benefits associated with processing, as compared to synthetic fibers such as glass, nylon, carbon, etc. However, mechanical properties of natural fiber composites are much lower than those of synthetic fiber composites. Another disadvantage of natural fiber compositeswhich makes them less attractive is the poor resistance to moisture absorption (Lackey et al., 2004). Hence use of natural fiber alone in polymer matrix is in adequate in satisfactorily tackling all the technical needs of a fiber reinforced composite. In an effort to develop a superior, but economical composite, a natural fiber can be combined with a synthetic fiber in the same matrix material so as to take the best advantage of the properties of both the fibers. This resultsin a hybrid composite.Pavithran et al. (1991a,b) evaluated the enhancement in theproperties of coir-polyester composites by incorporating glass as intimate mix with coir. Mohan and Kishore (Kishore, 1985,1983) reported that jute provided a reasonable core material in jute-glass hybrid laminates. They evaluated flexural properties (Kishore, 1985) and compressive properties (Kishore, 1983)of the jute-glass reinforced

Design And Analysis of a Boat Hull using Different Materials

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Abstract- The primary goal of the work is to investigate the structural behaviour of boat hull structures that are subjected to torsion and shearing using finite element theories. And one of the areas of ship hydrodynamics research that is currently most active is the creation of techniques for calculating the drag coefficient of the steady, free-surface, viscous flow around a ship hull. A trustworthy method for predicting ship performance is frequently utilised in experimental experiments. Computational Fluid Dynamics (CFD) has advanced significantly in recent years thanks to the creation of new numerical tools, improvements in computer technology, and enhanced data processing capacities. This has made it possible for ship designers to build a computer-generated model of a ship and evaluate its performance at various speeds in a virtual setting for further optimization. To establish minimal drag and high propulsive efficiency and to comprehend the complex flow characteristics for an ideal hull design, the results of the CFD simulations are required. This enables the designers to foresee if the ship's overall resistance is within acceptable bounds. This research offers an analysis of a ship hull design using computational fluid dynamics (CFD).

Indexed Terms- ANSYS, CFD Analysis, Finite element method, open deck structures, SHIP-HULL, SOLID-WORKS 2016.

I. INTRODUCTION

Ship structure design and analysis has always been a very important and active field of scientific research, in an effort to make those structures more reliable and cost effective. Much of this work was initially aiming to develop methods to determine the hull girder strength, and although these early methods gave adequately safe designs for common ship structures it has been shown by full-scale tests that the mechanisms of failure where frequently different from the predictions of those methods. The major cause for that discrepancy is the non-linear behavior of the individual components and subsequently the entire system. These observations led to an increasing concern with the local phenomena as opposed to the global phenomena. A Great amount of research was devoted then to the Ultimate strength and behavior of individual ship structural components such as individual plates, stipend plates and grillages (figure). Based on the knowledge of these individual components, various methods were developed in an attempt to determine the ultimate strength for theentire ship hull.

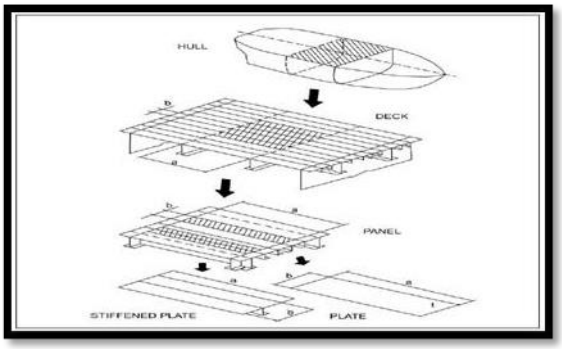

Fig: Ship hull girder as box-like thin-walled stiffened structure.

From a variety of methods, one of the most exhaustive is the one developed by Ostapenko, where the behavior and ultimate strength of longitudinal stiffened ship hull girder segments of rectangular single-cell cross section, subjected to bending, shear and torque, were analyzed analytically and tested experimentally.

This method produces accurate results for the bending and shear load cases, but not so acceptable results

Analysis of Material Strenth For Composites With Sisal Jute And Alovera As Fibre

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Abstract

Somewhat recently the composites have been generally utilized in the development, vehicle and aviation ventures. Among them, Natural fiber composites are arising as minimal expense, lightweight and better options than manufactured fiber composites. This study connected with the improvement of bio-degradable composites utilizing Epoxy pitch and Sisal/Jute strands. The filaments are artificially treated at various rates of NaOH i.e.,3%, 6% and 9%. Ductile and flexural strength of the composites were resolved utilizing UTM. The regular frequencies of the cantilever composite shaft were resolved scientifically utilizing Euler's hypothesis and mathematically utilizing Ansys 15.0. From the outcomes, the outcomes concur near one another.

Keywords: *Sisal Fiber, Jute Fiber, Alkali Treatment, Modal Analysis.*

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1. INTRODUCTION

Natural fiber composites are alternatives to synthetic fiber reinforced composites, since the former fibers possess many advantages, such as high specific strength, low cost, low density, biodegradability, renewability, good thermal and acoustic insulating properties. From the past decade jute, sisal, coir, kenaf, banana, hemp, palmyra, flax etc., natural fibers are used as reinforcement in polymer composites for various engineering applications.

For the past decade, enormous work has been carried out on the characterization of the mechanical and physical properties of natural fiber reinforced polymer matrix composites in the form of short fibers, random distribution and single reinforcement by varying the weight percentage of reinforcement and different chemical treatment of fibers. Sardar et.al. [1] Investigated the Tensile Test on Sisal Fiber Reinforced Polyster Composite Material, by varying the weight percentage of fiber i.e., 15, 25, 35 and 45% and results shows that improvement in tensile properties of 15%,25%, 35% and 45% by increasing the percentage of fiber. Karthikeyan et.al. [2] studied the impact behavior of coir reinforced epoxy composite treated with alkali. In this study, coir fibers treated with NaOH of 2, 4, 6, 8 and 10% for 10 days. For each group of fiber, coir length was 10, 20 and 30 mm. from the study, it is observed that, alkali treated specimens showed an improvement in impact strength of 15% compared with untreated fiber. Rokbi et al**.** [3] have studied the flexural properties of Alfa fiber reinforced composites by the influence of alkalization, and observed alkali treated fibers exhibits better properties compared to the untreated fiber composite.

Siddika et al. [4] studied the mechanical behavior of Hybrid Jute-Coir Fiber Reinforced Composites at 5, 10, 15 and 20 wt % fiber loading. 1:1 ratio of fibers are utilized during composite manufacturing. Mechanical properties were evaluated using ASTM standards. The study presents that tensile strength and Young's modulus of the compositeswere decreased and increased respectively with an increase in fiber loading. Hardness, Flexural and impact properties were increased with an increase in fiber loading. 20% fiber composite yielded the best set of mechanical properties compared to other composites.

Ravi et al, [5] studied Mechanical Characterization of Banana/Sisal Fiber Reinforced Hybrid Composites for Structural Application. In this study, the composites are prepared with untreated and akali treated fibers by varying the weight percentage of fibers. The study shows that tensile properties of the treated fiber were higher than those of untreated fiber reinforced composites. It is believed that the fiber treatment improved the interfacial interaction, thus resulting in good strength and stiffness of the biocomposites materials. Dixit et al. [6] studied the Mechanical Behaviour of Hybrid Coir/Sisal/Jute reinforced polyester composite,and observed that the properties of hybrid composites are better than unhybrid composites.

Structures will vibrate in the excessive oscillatory motion. because of interaction between the inertial and elastic properties of the materials within a structure is called resonance. Reducing vibration is a primary task in design process. The resonant amplitude of vibration is significantly influenced by damping which is more in fiber reinforced composite structures than metal structures due to the viscoelastic behavior.

From the literature survey, it is observed that the Jute and sisal fiber reinforced composites shows better mechanical properties by varying the weight percentages of fibers, and also the alkali treatment of fibers shows better results

A STUDY ON IMPROVEMENT IN COMPUTATIONAL EFFICIENCY FOR HCI ENGINE USING TURBOCHARGERS AND SUPERCHARGERS

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Abstract: This effort was done to demonstrate how a turbocharger can improve an engine's performance. In the automotive industry, turbochargers boost an internal combustion (IC) engine's power without increasing its cylinder capacity. The use of such a mechanical component enables automakers to develop applications with more power and high torque. The performance of IC engines has been improved by numerous advancements. Therefore, turbochargers and superchargers are used with the majority of engines nowadays. It is well recognised that an increase in the volume of air or mixture in the cylinder can enhance an engine's power output, and a supercharger is crucial in boosting the volume of air. These factors are the main causes of the increasing use of superchargers and turbochargers in automotive applications. This review study aims to demonstrate the significance of turbochargers in the automobile industry.

Keywords: *Turbocharger, Engine, Intercooler*

INTRODUCTION:

A turbocharger is a turbine-driven forced induction device that increases an internal combustion engine's efficiency and power output by forcing extra air into the combustion chamber. This improve over a naturally aspirated engine's power output is due to fact that compressor can force more air into combustion chamber than atmospheric pressure. A turbocharged engine produces more power than any other engine. This can mostly improve the power-to-weight ratio for the engine.. This can mostly improve the power-to-weight ratio for the engine. In order to obtain boost, the turbocharger compressor pull ambient air and compresses it before it enters into the intake manifold at increased pressure. This gives a greater mass of air entering the cylinders on each stroke. The power required to spin the centrifugal compressor derived from the kinetic energy of the engine's exhaust gases.

1.1 NEED OF TURBOCHARGER

The aim of a turbocharger is to improve an engine's volumetric efficiency by increasing density of the intake gas (usually air) allowing more power per engine cycle. The turbocharger's compressor draws in ambient air and compresses it before it enters into the intake manifold at increased pressure. The purpose of a turbocharger is to increase the power output of an engine by supplying compressed air to the engine intake manifold so increased fuel can be utilized for combustion. The purpose of the altitude compensator is to maintain consistent power output and efficiency of an engine operating at all altitudes.

1.2 HOW A TURBOCHARGER WORKS

'A turbocharger is a special type of supercharger in which a gas turbine is used to raise the pressure of air or air- fuel mixture that is to be supplied to the engine. Turbochargers are powered by the kinetic energy of exhaust gases from the engine'. Turbochargers are a type of forced induction system. They compress the air flowing into the engine. The advantage of compressing the air is that it lets the engine squeeze more air into a cylinder, and more air means that more fuel can be added. Therefore, we get more power from each explosion in each cylinder. A turbocharged engine produces more power overall than the same engine without the charging. This can significantly improve the power-to-weight ratio for the engine. In order to achieve this boost, the turbocharger uses the exhaust flow from the engine to spin a turbine, which in turn spins an air pump. The turbine in the turbocharger spins at speeds of up to 150,000 rotations per minute (rpm) -- that's about 30 times faster than most car engines can go. And since it is hooked up to the exhaust, the temperatures in turbine are also very high.

A Study On Improvement In Computational Efficiency For DCI Engine Using Fluent Software

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Abstract- Inner Combustion Engines in current days is the most ideal that anyone could hope to find solid wellspring of force for all homegrown, huge scope modern and transportation applications. The significant issue emerges at the productivity of these motors. Each endeavor made to further develop these motors will in general accomplish the most extreme proficiency. The exhibitions of the diesel motors are upgraded by appropriate plan of channel complex, ventilation system, ignition chamber, cylinder and so on. The review is about the impact of cylinder designs on in-chamber stream. Here a solitary chamber direct infusion diesel motor is utilized for study. For getting twirl power helical-twisting blend delta complex is utilized. Expansion in whirl power brings about better blending of fuel and air. Whirl Velocities in the charge can be significantly expanded during pressure by reasonable plan of the cylinder. In the current work, a concentrate on the impact of various cylinder setup on air movement and choppiness inside the chamber of a Direct Injection (DI) diesel is completed utilizing Computational Fluid Dynamics (CFD) code Fluent 13. Three layered models of the manifolds, cylinders and the chamber is made in CATIA V5 and fit utilizing the pre-processor Hypermesh 10.0..

Index Terms- CFD, inlet manifold, piston configurations, swirl ratio, tumble ratio, volumetric efficiency.

I. INTRODUCTION

As engines have evolved over the years, pistons have evolved with them. They're getting shorter and lighter, and use smaller skirts — the cylindrical "body" of the piston. Newer pistons are often made of aluminum alloys comprised of more silicon than in the past. This improves resistance to heat and reduces thermal expansion.

One of the biggest advancements in piston technology is the use of different piston "tops" or "crowns," the part that enters the combustion chamber and is subjected to combustion. While older piston tops were mostly flat, many now feature bowls on top that have different effects on the combustion process. The pistonbowl is primarily used in diesel engines. Diesels don't have an ignition phase, so the piston crown itself may form the combustion chamber. These engines often use pistons with differently shaped crowns, although with direct injection becoming increasingly popular, gasoline engines are starting to use them as well.

The shape of the piston bowl controls the movement of air and fuel as the piston comes up for the compression stroke (before the mix is ignited and the piston is pushed downward.) The air and fuel swirl into a vortex inside the piston bowl before combustion (or compression) takes place, creating a better mixture.

By affecting the air/fuel mixture, you can achieve better and more efficient combustion, which leads to more power. The bowls have a variety of different shapes; some are also designed to optimize fuel economy. With direct injection becoming the hottest new technology for gasoline engines, expect uniquely-bowled pistons to become more and more popular. In high-speed direct-injection Diesel engines, the flow conditions inside the cylinder at the end of the compression stroke, near top dead center (TDC), are critical. for the combustion process

These are determined by the air flowing into the cylinder through the intake valves during the induction process and by its evolution during the compression stroke.

Many researchers had been studied on piston geometry effecting the flow distribution of diesel engine. This chapter reviews the previous published literatures, which lays the foundation and basis for further work in this project. This helps to give a better understanding about the topic and also acts as a guideline for this thesis.

Benajes and Margot *et al.* [6], studied the flow characteristics inside the engine cylinder equipped with different piston configurations were compared. For this, complete calculations of the intake and compression strokes were performed under realistic operating conditions and the ensemble-averaged velocity and turbulence flow fields obtained in each combustion chamber analyzed in detail. The results confirmed that the piston geometry had little influence on the in-cylinder flow during the intake stroke and the first part of the compressionstroke. However, the bowl shape plays a significant role near TDC and in the early stage of the expansion stroke by controllingboth the ensemble-averaged mean and the turbulence velocity fields.

Aita *et al.*[1] studied the swirl motion in the cylinder during the intake and compression strokes on a real geometry with one intake valve, but presented little validation of their calculations. Chen *et al.* [4] performed calculations of the full intake and compression processes and presented some comparisons with experimental data. Their results showed that calculations significantly under predicted the turbulence velocity. They explained the differences by errors in the experimental data and the limitations of the standard k–ε model. Dillies *et al.* [5] also presented similar calculations of a Diesel engine with one intake valve for one combustion chamber, and in this case results compared reasonably well with the experiments. Celik *et al.* [3] made a review of computations based on large eddy simulation

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Machinability Performance Of Al2025 On Cnc Using Grey Rational Analysis

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ABSTRACT-- The aircraft, spaceship, automotive, nuclear, biotechnology, electrical, and sporting goods industries are the main users of metal matrix composites. Usually, tests are conducted to lower the cost of the composites due to their high cost, and expensive materials are used for metal matrix composites. Alloys in which aluminium predominates are called aluminium alloys. 1 kg of Al (6351), 50 grammes of Sic, and 50 grammes of B4C were used as samples during the stir casting process. The sample is then created as a cylindrical rod with a 30mm length and 10mm diameter. In order to improve the machinability of stir-cast aluminium alloy 6351 with Silicon Carbide and Boron Carbide reinforced metal matrix composites (MMC'S), multi-factor based experiments are applied in this work. On a CNC turning machine, Grey relational analysis is used to examine the effects of parameters like Cutting Speed, Feed Rate, and Depth of Cut on the Power, Surface Roughness, and Material Removal Rate. To determine which design variables significantly affect the machinability of the composite, analysis of variance (ANOVA) is also carried out.

KEYWORDS: Surface Roughness, Material Removal Rate, Power.

I. INTRODUCTION

A composite material is a material composed of two or more constituents. Generally a composite material is composed of reinforcements (fibers, particles/ particulates,flakes) embedded in a matrix (metals, polymers). MMC manufacturing can be in two ways: Solid,Liquid. Powder blending and consolidation: Powder metal and discontinuous reinforcements are mixed and then bonded through a process of compaction, degassing and thermo-mechanical treatment (extrusion). Liquid phase fabrication methods are moreefficient than the solid-phase fabrication methods because solid-phase processing requires a longer time. Aluminum alloys are alloys in which Al is the predominant metal. The typical alloying elements are copper, magnesium, manganese, silicon and zinc. There are two principal classifications, namely cast alloys and wrought alloys. The physical properties of Aluminum alloy: Melting point, Modulus of elasticity, Poisson's ratio. The role of the reinforcement material in a composite material increases the mechanical properties of the base metal respectively. All of the different particulates or fibers used in composites have different properties andso affect the properties of the composite in different ways: High strength, Ease of fabrication and low cost. Silicon carbide (SiC), also known as carborudum, is a compound of silicon and carbon with the chemical formula SiC. The properties of silicon carbide: Melting point: 2200-2700, Hardness (Kg/mm²): 2800. Boron carbide (B_4C) is an extremely hard boron-carbon ceramic material used in tank armor, bulletproof vests and numerous industrial applications robust material having high hardness, high cross section. The following are the properties of boroncarbide: Melting point: 2763˚c, Boiling point: 3500˚c, Density: 2.52 g/cm³, Poisson's ratio: 0.207

II. PROBLEM DEFINITION

Aluminium alloys have aluminum as the predominant metal in it. The typical alloying elements are Copper, Magnesium, Silicon and Zinc. Though there are aluminum alloys with some higher tensile strength than the commonly used type of steels, simply replacing a steel part with an aluminum alloy might lead to problems. An important structural limitation of aluminum alloys is their lower fatigue strength.

III. METHODOLOGY PROPOSED

Metal Matrix composites have been chosen in the present study. From the series of wrought alloys, Aluminum 6351 series have been chosen in which magnesium and silicon are alloyed. The above composite material is fabricated by the stir casting technique. Then the casted material is machined as per ASTM standard. The aim of the experiment is to study about the mechanical properties of the hybrid composite and also to study the machining parameters and to plot

SOLAR POWERED AUTONOMOUS QUADCOPTER

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*Abstract:*The Solar-Powered Autonomous Quadcopter (SPAQ) is a standalone autonomous surveillance system designed to carry out intelligently the capturing of video data from remote locations. Analytically, the SPAQ comprises four units: the solar power system, the autonomous navigation system, the flight control system and the surveillance system.Appropriate designs were made for the constituent parts of the SPAQ system with full implementation carried out on the surveillance system using a KK 2.0 flight controller. The inclusive hardware segment of the SPAQ was achieved with the modular system design approach. The incorporated on-board solar power system is designed to extend the flight time for the SPAQ in order to suit time-tasking applications.

Index Terms – autonomous, quadcopter, solar power, surveillance

I. INTRODUCTION

A Quadcopter**,** also called a Quadrotor helicopteror Quadrotor, is a multi rotor helicopter that is lifted and propelled by four rotors. Quadcopters are classified as rotorcraft, as opposed to fixed-wing aircraft, because their lift is generated by a set of rotors (vertically oriented propellers).

Unlike most helicopters, quadcopters use two sets of identical fixed pitched propellers; two clockwise (CW) and two counter-clockwise (CCW). These use variation of RPM to control lift and torque. Control of vehicle motion is achieved by altering the rotation rate of one or more rotor discs, thereby changing its torque load and thrust/liftcharacteristics.

Early in the history of flight, quadcopter (referred to as 'quadrotor') configurations were seen as possible solutions to some of the persistent problems in vertical flight; torque-induced control issues (as well as efficiency issues originating from the tail rotor, which generates no useful lift) can be eliminated by counter-rotation and the relatively short blades are much easier toconstruct.

More recently quadcopter designs have become popular in unmanned aerial vehicle (UAV) research. These vehicles use an electronic control system and electronic sensors to stabilize the aircraft. With their small size and agile maneuverability, these quadcopters can be flown indoors as well as outdoors.

There are several advantages to quadcopters over comparably-scaled helicopters. First, quadcopters do not require mechanical linkages to vary the rotor blade pitch angle as they spin. This simplifies the design and maintenance of the vehicle. Second, the use of four rotors allows each individual rotor to have a smaller diameter than the equivalent helicopter rotor, allowing them to possess less kinetic energy during flight. This reduces the damage caused should the rotorshit anything. For small- scale UAVs, this makes the vehicles safer for close interaction. Some small-scale quadcopters have frames that enclose the rotors, permitting flights through more challenging environments, with lower risk of damaging the vehicle or its surroundings. Due to their ease of both construction and control, quadcopter aircraft are frequently used as amateur model aircraftprojects.

II. METHODOLOGY OF THE PRESENT WORK

Insects are chosen as models because their nervous system are simpler than other animal species. Also, complex behaviours can be attributed to just a few neurons and the pathway between sensory input and motor output is relatively shorter. Insects' walking behaviour and neural architecture are used to improve robot locomotion. Alternatively, biologistscan use hexapod robots for testing different hypotheses.

Biologically inspired hexapod robots largely depend on theinsect species used as a model. The cockroach and the stick insect are the two most commonly used insectspecies; both have been ethologically and neurophysiologically extensively studied. At present no completenervous system is known, therefore, models usually combine different insect models, including those of otherinsects.

Insect gaits are usually obtained by two approaches: the centralized and the decentralized control architectures. Centralized controllers directly specify transitions of all legs, whereas in decentralized architectures, six nodes (legs) are connected in a parallel network; gaits arise by the interaction between neighboring legs.

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Machinability and Formability of Aluminum Material for Metal Matrix Composites

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ABSTRACT

The influence of reinforcement ratios on the forgeability and machinability of the aluminium alloy, or LM6 based composites, reinforced with varying weight fractions of SiC particles, was studied in the current research. The test findings demonstrate that although the forgeability of the cast MMCs lowers, the weight percentage of reinforcement particles increased in the matrix metal provided higher mechanical properties like hardness. Along with the change in casting thickness, the forgeability of the MMCs as they were cast also changed. The findings demonstrate that, in comparison to both end sections of a three-step casting, the forgeability of cast metal matrix composites is lowest near the midpoint of the casting. During experiments, the impact of machining parameters, such as cutting speed and depth of cut, on the surface roughness and cutting forces at constant feed rate was examined. The findings demonstrate that increased SiCp reinforcement weight percentage results in increased surface roughness and requires greater cutting forces during machining operations. Additionally, it has been noted that the cutting forces and surface roughness were modified by the cutting depth and speed at constant feed rate. Today's manufacturing engineers will benefit from the practical research analysis and test results on the forgeability and machinability of Al/SiC-MMC.

Keywords: *MMC, Mechanical properties, Forgeability, Machining, Surface roughness*

1. INTRODUCTION

Composite materials are engineered combinations of two or more materials in which tailored properties are achieved by systematic combinations of different constituents. Various types of

Performance Analysis of Heat Pipe Using Analysis Software's

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Abstract

To remove a significant amount of heat from the heat source, heat pipes are a passive heat transfer mechanism. The heat pipe's performance is influenced by a number of variables, including its diameter, working fluid, wick structure, wick mesh size, etc. In this work, the various mesh sizes are 40, 60, 80, 100, and 120 square inches in order to evaluate the impact of wick mesh size on heat pipe performance. According to the testing findings, heat pipes with a mesh size of 100 square inches will function better than those with smaller mesh sizes.

Keywords: *Heat pipe, mesh size, thermal efficiency, wick structure, thermal resistance*

I. INTRODUCTION

The rapid and extensive development of technology over the electronic components leads the engineers to create a equipments with more efficiently and at very low costs. Due to this, an enormous amount of heat will be released with the reduction in size of equipments with more difficult specifications. So it is necessary to cool the electronic components as soon as possible and quickly, otherwise the electronic components are damaged. This leads to the development of heat pipe which is used to remove large amount of heat over a small temperature difference between two temperature limits. Amir faghri [1] defined that heat pipe was an passive device for radiating heatat a larger rate over a distance with small temperature drops between two temperature limits. Heat pipe comprises of three sections namely evaporator, adiabatic and condenser. The heat issupplied to the heat pipe in the evaporator section which converts the working fluid into vapour and returned to the condenser, due to capillary action of the wick structure. Yu-wei chang [2] utilised the heat pipe for cooling the electronic components and concluded that the evaporation resistance and condensation both increases with increase in heat input and decreases with filling ratio. Seok Hwan moon *et al* [3] implemented the concept ofminiature heat pipe with wick material of woven to increase the cooling effect of notebook PC and showed that miniature heat pipe MHP cooling modules with wicks satisfies a demand condition of0 to 100 °C.

Khalid Joudi *et al* [4] compared the performance of gravity assisted heat pipe with modified heatpipe with a separator in the adiabatic section. The results evidenced that modified heat pipe with separator is more efficient than gravity assisted heat pipe. Shinzo Shibayama and ShinichiMorooka [5] analysed both experimental and theoretical about the various limits such as capillary limit, maximum heat transfer limit of wick, friction loss and capillary properties.

A. K. Mozumder *et al* [6] made an attempt to design, fabricate and test a miniature heat pipe with 5 mm diameter and 150 mm length with a thermal capacity of 10 W. Experiments were conducted with and without working fluid for different thermal loads to assess the performance of heatpipe. Finally the optimum liquid fill ratio is identified in terms of lower temperature difference, thermal resistance and higher heat transfercoefficient.

Faghri *et al* [7] numerically analysed the transient and steady state performance of heat pipes with multiple heat sources and sinks. They concluded that the steady state of the heat pipesignificantly changes with a change in the emissivity of the heat pipe wall and subsequently increases the power input in the evaporator section. Sun *et al* [8] the results implicated that a higher value of the capillary heat transport limit can be achieved when the heater placed symmetrically at the centre of the evaporator section as compared to the one side of the evaporator section. Patrik Nemec *et al* [9] made a detailed study about the working position of the heat pipe in both horizontal and vertical direction .They concluded that heat pipe can able to operate at both positions. Manikandan *et al* [10] analysed the effect of container diameter of heat pipe using Response Surface Methodology method to determine the optimal diameter. From that analysis the optimum diameter of heat pipe is 20 mm based on the thermal efficiency and thermal resistance.Senthil kumar *et al* [11] analysed the heat pipe used in the energy conservation and waste heat recovery system. In their work, the heat pipe is fabricated with two layers of mesh size 80 /square inch and analysed the effect of using nanofluids in the heat pipe. K.N.Shukla *et al* [12] used four layered 100 mesh size copper screen to measure the thermal performance of cylindrical heat pipe using nanofluids and noticed that it is more improvement in the heat transfer coefficient. Ghanbarpour *et al*
[13] used two layers of screen mesh wick of 150

Optimum Design of closed circle Layout In Flexible Manufacturing System–An Approach Of NTOT

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Abstract – *Any computer program that utilises an advanced mathematical approach for logic to do optimization and simultaneous on limited capacity scheduling and other tasks is referred to as a differential evolution and simulated annealing technique for simultaneous machine scheduling. In order to reduce make span and mean tardiness, this study addresses the issue of a machine and automated guided vehicle system operating simultaneously. The most effective method for achieving faster convergence and optimal solution is non-traditional approach. In order to create accurate scheduling utilising simulated annealing and differential evolution methodology, a suitable simultaneous scheduling mechanism is designed in this study. This approach provides the best answer for the benchmark problem selected from the literature.*

***Key Words*: Automated Guided Vehicles, Make-span, Tardiness, Simultaneous Scheduling, Differential Evolution, Simulated Annealing**

1. INTRODUCTION

The objective of scheduling is to find a way to assign and sequence the use of these shared resources such that production constraints are satisfied and production costs are minimized. Simultaneous scheduling in the manufacturing environment can be defined as the process of deciding what happens when and where. In scheduling theory, it is often assumed that the time taken to move jobs from one machine to another is negligible. But in many real life situations, this Movement can have a significant effect on the complete time of the jobs, thus adding a parameter to the optimization function. This work looks at the situation where the job travelling time between machines is taken into account. Author, therefore, present a differential evolution (DE) and simulated annealing (SA) for the simultaneous scheduling of machines and AGVs in an FMS for process plan design. Scheduling is the process of allocating shared resources over time for competing activities is known as scheduling. It has been the subject of a significant amount of literature in the operations research field. A flexible manufacturing system is a highly automated manufacturing system well suited for the simultaneous production of a wide variety of part types in low to mid volume quantities at a low cost while maintaining a high quality of the finished products.

1.2 LITERATURE SURVEY

The importance of the material handling system for the efficiency of the overall system has been emphasized by several researchers.

Medikondu.Nageswararao et al., proposed an efficient and optimized Automated Guided Vehicles (AGVs) operation plays a critical role in improving the performance of a Flexible Manufacturing System (FMS). It is proven that the method is capable to provide better solution compared to others [1].

Noboru Murayama and Seiichi Kawata. Focused on simultaneous scheduling of processing machines and multiple-load automated guided vehicles and proposed a simulated annealing method for the simultaneous scheduling problems of machines and multiple-load AGVs to obtain relatively good solutions for a short time [2].

IMPACT OF CONGESTION ON TRAFFIC DESIGN AND TRAVEL TIME ON NATIONAL HIGHWAYS IN INDIA

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Abstract: When traffic flow is least impeding and there is lean traffic (free flow), the cars often drive at their own speeds. Due to interactions with other moving vehicles in the traffic stream, when traffic flow rises, the cars are unable to maintain their free speeds. Additionally, for the same average speed, cars driving in clogged traffic conditions will use more fuel than those operating in steady-state traffic conditions. Due to this, the vehicles' journey times and fuel usage lengthen, increasing the overall cost of road users (RUC). Contrarily, under conditions of free-flowing traffic, fuel consumption is likewise high at very high speeds, increasing RUC. In order to determine a fair assessment of RUC on Indian highways, it is necessary to simulate the travel time and fuel cost of the vehicle owing to congestion and free flow circumstances (uncongested). In the current study, relationships between the cost of congestion and steady-state conditions have been developed between the Congestion Factor and Volume-Capacity Ratio by taking into account different vehicle types travelling on multi-lane highways with varying widths (four, six, and eight lane divided carriageways). While fuel consumption data was gathered using highly advanced, sophisticated fuel flow metering equipment, time-related data was collected utilising a questionnaire survey method (V-Box). By taking into consideration a part of NH-2 in Delhi, the established equations have been effectively used to demonstrate their usefulness in terms of estimating realistic effect of congestion on time and fuel cost. According to the analysis, the congestion effect has a greater impact on heavy commercial vehicle fuel costs than it does on passenger vehicle time costs. However, multi-axle vehicles experience the greatest combined fuel and time cost effects from congestion, followed by cars, two-wheelers, and buses.

Keywords: fuel cost, travel time cost, congestion, Indian highways.

1. Introduction

Traffic congestion is recognised throughout the world as a growing problem. It is particularly important in Asian countries like India where many cities operate under severely congested traffic conditions on a daily basis due to heterogeneous traffic mix. Congestion is in fact the saturation of road network capacity due to regular or irregular

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Performance Analysis Of Marble (Caco3) Filled C96300 Alloy For Journal bearing

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Abstract With the aid of liquid metal stir casting procedures at various weight percentages, our current work focuses on the manufacture of copper-based alloy C93200 composites that are filled with marble (CaCO3) (0wt percent , 1.5wt percent , 3wt percent , 4.5 wt percent and 6wt percent of marble). In order to compare with manufactured composites, an unreinforced C93200 matrix alloy sample is also created. Evaluation and comparison of the microhardness, tension test, three point bending test, and void percentage of the manufactured composites with the unreinforced C93200 base matrix alloy. The experiment showed that as the weight percent of marble particles increased up to a certain limit then decreased, the tensile strength, flexural strength, and hardness of C93200-Marble composites increased (although the toughness of composites was adversely affected). Additionally, it can be noted that for marble ranging from 0 weight percent to 4.5 weight percent, the produced composites' void fraction falls from 0.785 percent to 0.497 percent (CaCO3). Similar to this, the hardness value of marble-filled C93200 copper-based alloy composites improves initially from 115.49 Hv to 128.97 Hv for 0wt percent to 4.5wt percent of marble, but reduces to 121.51 Hv upon further addition of marble particles (6wt percent)..

Keywords— Bearing Material**,** C93200, Marble, MMCs, Stir Casting, Mechanical Properties.

I. INTRODUCTION

For the last several decades, there has been conspicuous interest in the fabrication and use of copper based metal matrix composites. However very limited literatures exist on copper based metal matrix composites for bearing applications. The most common materials used for bearing are Brass, Bronze and white metal, in addition to these bearing material aluminium and zinc based alloy are also used as a bearing material. The materials which are used for bearing should have high compressive strength, good fatigue strength, good corrosion resistance, minimum coefficient of friction, minimum thermal expansion, and excellent in thermal conductivity. In addition to these properties bearing materials should also have enough hard. One of the most important property is high strength to weight ratio that should posses the bearing materials and this glamorous property may be achieve by developing the MMCs.

Tin bronze (SnBr) based alloys are generally used for main spindle bearing, machine tool bearing, bearing for cranes, roll neck bearing, roll mill bearing, thrust washer, pump, bushing etc. Generally rolling element bearings are used in high precision machine parts in rotational machine for different area of application [1]. To support the spindle and shaft rolling element bearings are preferred for the conversion of load on an application via rotational motion. Basically rolling element bearings are employed in industries and it generally fails due to malfunction or calamitous failures of machineries which results in machine breakdown [2]. Also rolling element bearings are employed in grinding machine, wind turbine, gear box, gas turbine and lathe machine [3].In many tribological fields Bronze based Cu-Sn has been used because of self lubricating, higher strength and good corrosion resistant properties [5-10]. These types of copper based alloy (Bronzes) have been used in chemical industry, navigation, pivots, spring in electro technology, corrosion resistant gear and crank pivot bearing [10-12]. During fabrication of metal matrix composites the probability of particle segregation, undesirable brittleness phase formation, casting defects, and inconsistent distributions are some common issues. So to overcome these issues powder metallurgy route is preferred [13-15]. According to Gangwar et al. [16] hardness of SiBr composites increases as wt% of CaO increases and void content decreases as wt% of CaO increases up tocertain limit. Authors Yih et al. [17] developed the brass metal matrix composites reinforced with silicon carbide whiskers with the aid of powder metallurgy route and they concluded that hardness and compressive yield strength of composites were improved and thermal expansion of composites was reduced as compared to base alloy. Authors Zhou et al. [18] developed the $MgAl_2O_4$ spinel whiskers reinforced Aluminium MMCs with the aid of powder metallurgy techniques and there results showed that hardness of composites was increased as amount of $MgAl_2o_4$ whiskers increases as compared to unreinforced aluminium base alloy.

The main motive of metal matrix composites is to combine the desirable properties of base metal alloy and reinforcing materials. Some common ceramic material like SiC, Al2O3, MgO, Whiskers and fibre have generally used as reinforcement material to enhance the properties of MMCs [19-22]. The major task in developing the metal matrix composites is the insertion of reinforcing particulate or materials into the base alloy. The desired strength of composites is greatly influenced by interfacial bonding strength between matrix alloy and reinforcing particles.

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Enhancement of R410 Performance in Vapour Compression Refrigeration System

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Abstract: **Results of an experimental examination of a vapour compression refrigeration (VCR) system using R-410 refrigerant were reported. The main performance analysis parameters, such as the mass flow of refrigerant, the amount of subcooling and superheating, the coefficient of performance (COP), the power needed to run the compressor at various evaporating temperatures, and the percentage increase in COP and percentage decrease in power needed to run the compressor for VCR, all have an impact on the refrigerating effect. At the conclusion of the compressor, a shell and coil heat exchanger is added as part of further research.**

Keywords: Vapour compression refrigeration, Heat exchanger, COP, power.

I. INTRODUCTION

Vapour compression refrigeration system is based on vapour compression cycle. Vapour compression refrigeration system is used in domestic refrigeration, food processing and cold storage, industrial refrigeration system, transport refrigeration and electronic cooling etc. So improvement of performance of system is too important for higher refrigerating effect or reduced power consumption for same refrigerating effect. By sub-cooling using heat exchanger at condenser inlet refrigerating effect increases and power consumption or work input decreases. Thus performance of cycle is improved. Along with this waste heat also recovered. The essential quantity of heat recovered is not the amount but it is value.

Lokapure and Joshi [1] In their article dealt energy conservation by using technique of utilizing waste heatfrom air-conditioning system and increasing COP. Theysaid that the refrigeration heat recovery device is indirect type of system in which a refrigerant to water heat exchanger is installed between the host refrigeration systemcompressor and condenser. In this case they achieved their goal by recovering energy and improving COP up to 13%. Khurmi and Gupta [2] in their book gave evidence that the process of under cooling is also brought about byemploying a heat exchanger. This increases refrigerating effect and finally improved coefficient of performance in vapour compression refrigeration system. Domanski [3] investigated the effect of LLSL-HX (Liquid line/ Suction line heat exchanger) on system performance by taking liquid refrigerant from condenser to exchange heat with vapor refrigerant from evaporator. They reported that coefficient of performance was increased after installing LLSL-HX. Jain et al. [4] analyzed a complex system in order to utilize waste heat rejected by condenser to the atmosphere by installing additional water cooled condenser. Baskaran and Mathews [5] described systems including various refrigerants improved by analyzing the effect of the super heating / sub cooling case. Better performance coefficient values (COP) than those of non- super heating /sub cooling case are obtained. Rajput [6] in his book concluded that sub-cooling results in increase of C.O.P and said that no further energy has to be spent to obtain the extra cold coolant. Thirumaleshwar [7] proposed correlations for overall heat transfer coefficient for parallel and counter flow heat exchangers. Coronel and Sandeep [8] determined convective heat transfer coefficient in both helical and straight tubular heat exchangers under turbulent flow conditions. The experiments were conducted in helical heat exchangers and their study shows that the heat transfer coefficient in coiled tubes is higher than that in straight tubes.

II. SYSTEM DESCRIPTION AND DESIGN

Heat flows naturally from hot to colder body. But, in refrigeration system there is opposite phenomena i.e. heat flows from a cold to a hotter body. This is achieved by using a substance called a refrigerant. The refrigerant (R- 12) absorbs heat and hence evaporates at a low pressure to form a gas. This gas is then compressed to a higher pressure, such that it transfers the heat it has gained to ambient air or water and turns back (condenses) into a liquid. Thus, heat is absorbed, or removed, from a low temperature source and transferred to a higher temperature source. The refrigeration cycle can be broken down into thefollowing stages as in Fig 1.

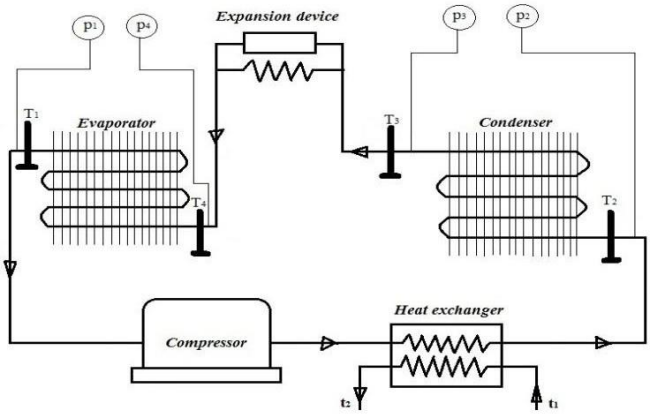

Fig.1: Schematic diagram of a proposed VCR System

Design of Wrung Order Layout UsingAdvanced Optimization Techniques with Integrated Variable Batch Scheduling

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Abstract Universally, specialists and scientists accept that flexibility assumes a elementary play in modern factory segment. Only associated with modest parcel size generation since agility adaptable is an indispensable part to be incorporate into course of action of racks in format plan among the assembling fragment. In view of such conditions, considering NP hard double target issues is, regularly, a lumbering responsibility. In this work, researchers tended to about a populace-based high end search techniques like differential development (DE) and sheep run tech- nique (SRT) for making wrung structure configuration matters in lithe system of manufacturing location. The instigators focused on twofold aim headway connected with fundamental objective is stressed over the versatile slot (FJSP) arranging issue, the accompanying objective focused on wrung order layout matters where expelling the interest of machineries within lead-ins of wrung steps to control rigid transference cost and hoarding working time of employments on machineries. The accomplish- ment of the estimation (SRT and TS) is crisscross by standard issues. At long last, it is pondered that SRT yields better outcomes at the point on par with TS.

2.1 Introduction

In the present situation, mechanized assembling ventures are under prodigious stress which brought about by the increasing expense of vitality, materials, works, capital, and strengthening overall challenge. While these patterns will stay for quite a while, the issue fronting producing today runs much cavernous. By and large, they come

from the very idea of the assembling procedure itself. So as to beat that, adapt- able manufacturing frameworks (@FMSs) are viewed as one of the most productive strategies to use in lessening or taking out assembling issues. FMS is in excess of a specialized arrangement [1]; it is a factory-based driven arrangement prompting to improve gainfulness via decreasing process times and stock levels and improved assembling viability through expanded operational adaptability, consistency, and control.

The FMS design includes assigning different hold for achieving full skill. The plan has an impact eager for elapsed time and cost [2] which ought to be resolved

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Abstract

Globally experts and researchers believe that litheness play a critical role in industrial sector. Exclusively connected with tiny lot size production because litheness flexible is a vital part to be include in arrangement of racks in layout design among the manufacturing segment. With regards to such conditions, considering NP hard dual objective issues is, commonly, a very cumbersome task. In this paper, authors addressed about a population based metaheuristics like differential evolution (DE) and sheep flock method

Optimization of Pecking Order Layout with Job Shop Scheduling as Constraint: An Approach of Metaheuristics

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Abstract. Globally experts and researchers believe that litheness play a critical role in industrial sector. Exclusively connected with tiny lot size production because litheness flexible is a vital part to be include in arrangement of racks in layout design among the manufacturing segment. With regards to such conditions, considering NP hard dual objective issues is, commonly, a very cumbersome task. In this paper, authors addressed about a population based metaheuristics like differential evolution (DE) and sheep flock method (SFM) for cracking Pecking order layout design issues in flexible lot arrangement environment. The originators concentrated on double target advancement of which essential goal is worried about the adaptable occupation (FJSP) planning issue, the following goal concentrated on Pecking request Layout issues where removing the demand of machines with in lead-ins of ladder to restrain hard and fast transportation cost and amassing lead time of vocations on machines. The execution of the estimation (SFM and DE) is checked by benchmark issues. Finally, it is contemplated that SFM outfits perfect results when differentiated with DE.

AQ1

AQ2

Keywords: Pecking order layout · FMS layout · Job shop scheduling · Differential evolution · Sheep flock method

1 Introduction

Flexibility in FMS is concern with dealing the machines, breakage of tools, changes in scheduling, part mix and alternative routing. Actually, this works relates Ladder layout design which is a plan of setup requirement for yielding products or rendering services with job shop scheduling as constraint. Problems concern with outline of a plant are commonly observed in industries linked to a position [1] of capacity in a plant.

Abbas and Khan et al. presented a contextual analysis for planning of jobs during processing of chunks on existing machineries. Further they estimated the Throughput and motion stint and action stint in terms of entire dispensation time [2]. Chaudhry and Luo reviewed that during 1990–2001 nearly 21 major production journals published genetic algorithm related papers [3]. Ku, Hu, Wang et al. addressed on how to crack the

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Mechanical Behavior Of GPRF Composite with biwooven fibre

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Abstract

Natural fibre reinforced plastic composites have gained popularity recently since they are more affordable and environmentally friendly than synthetic fibre reinforced composites. Researchers from all over the world have been enticed by the availability of natural fibre and the simplicity of manufacturing to experiment with cheap fibre that is readily available locally, investigate their viability for use as reinforcement, and determine how well they meet the requirements of a good reinforced polymer composite for structural application. In the beginning, natural fibres were mostly used to composite materials to increase bulk and lower costs rather than to enhance mechanical qualities. However, the situation has altered as a result of the environmental issues related to the manufacture and usage of synthetic fibres. Natural fibres have been widely used as reinforcement materials for synthetic and biodegradable products over the past 10 years.. Natural fibre reinforcements have mostly increased flexural and impact qualities; nevertheless, there has been some research on how little tensile strength has improved as a result. Numerous efforts have been undertaken to increase mechanical properties, including improvements to the interface, better processes for producing composites, new modelling methods, etc. In the current experiment, a new hybrid composite with epoxy as a resin and reinforcement from both bio waste (jute) and conventional filler (glass) was used. For all stacking sequences, the positions of the glass and jute fabric were kept at (00-900) and (450-450), respectively. Untreated woven jute and glass fabric reinforced epoxy hybrid composite has been studied for its tensile, flexural, and interlaminar shear properties in relation to the stacking sequence.

Key Words: Hybrid composite, Glass fiber, Jute fiber, Tensile strength, Flexural strength

1. INTRODUCTION

Environmental awareness and sustainability concept attracts researchers and scientist towards utilization of natural fibers as reinforcement in polymer-based composites. Natural fibre reinforced composites are attracting researchers due to their lower cost, light weight,high strength to weight ratio, renewability, lower density and lower energy requirements for processing. Natural fibers in the composite industry usually refers to wood fiber and agro based bast, leaf, seed and stem fibers. These fibres often contribute greatly to the structural performance of plant and when used in plastic composites can provide significant reinforcement. The stiffness and strength shortcomings of bio composites can be overcome by structural configurations and better arrangement in a sense of placing the fibers in specific locations for highest strength performance. Natural fiber composites can also be very cost effective material for application in building and construction areas (e.g. walls, ceiling, partition, window and door frames), storage devices (e.g. bio-gas container, post boxes, etc.), furniture (e.g. chair, table, tools, etc.), electronic devices (outer casting of mobile phones), automobile and railway coach interior parts (inner fenders and bumpers), toys and other miscellaneous applications (helmets, suitcases).Accordingly extensive studies on preparation and properties of polymer matrix composite(PMC) replacing the synthetic fiber with natural fiber like jute, sisal, pineapple,bamboo,kenaf and bagasse were

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Investigation of drilling process parameters on carbon epoxy fiber reinforced composite using fuzzy logic and Neural network

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Abstract - *The impact of cutting parameters during the drilling of Delrin material is covered in this article. Using HSS twist drills, experiments are carried out to determine the impact of drill diameter, point angle, spindle speed, feed rate, and depth of cut on the rate of material removal. The input parameters taken into account in this thesis are the point angle, tool diameter, spindle speed, feed rate, and cut depth. In the Taguchi method, various combinations of the aforementioned characteristics are taken into account to obtain the highest material removal rates. The variables are cutting tool drilling diameter of 6mm or 10mm, point angle of 118 or 120, speed of 800 or 1200 rpm, feed rate of 30 or 50 mm/min, and depth of cut of 0.5 or 1 mm. The Material Removal Rate (MRR) is calculated theoretically to test it and to calculate to confirm that the experiment has computed the Material Removal Rate (MRR) and the amount of time required. Using Taguchi design of experiments, trials are carried out on CNC milling machines, and a model is created with drilling parameters. Using MINITAB V19, the experimental outcomes were examined. The optimal speed is 1200 rpm, feed rate is 50 mm/min, depth of cut is 0.5 mm, tool angle is 1180, and drill diameter is 6 mm as determined by the Taguchi results. In order to determine how drilling parameters affect the quality of the drilled holes, the signal-to-noise (S/N) ratio is used.*

Key Words: DOE, S/N ratio, Taguchi method, drilling Operation, composite material

1. INTRODUCTION

Composite materials are widely used in the diverse applications such as aircraft, automobile, sporting goods, marine vessels, audio equipment etc. Because of its unique properties such as specific strength, fatigue strength, strength to weight ratio and corrosion resistance Machining of Delrin material is essential for all applications.

Drilling using twist drill is the most commonly employed operation of secondary machining for fiber reinforced materials. However, composite laminates are regarded as hard-to-machine materials, which results in low drilling efficiency and undesirable drilling-induced delamination. For rivets and bolted joints, damaged-free and precise holes must be drilled in the components to ensure high joint strength and precision. However, some special characteristics of composite laminates such as non homogeneous, anisotropic, and highly abrasive and hard reinforced fibers, result in them difficult to machine. Among the problems caused by drilling, delamination is considered the major damage. It was reported that, in aircraft industry, the rejection of parts consist of composite laminates due to drilling-induced delamination damages during final assembly was as high as 60.

1.1 Literature Review

Biren Desai [1] et.al studied an application of the full factorial design for optimizing the cutting parameters in drilling operations performance measures circularity and hole size. From this research, following conclusions could be reached with an optimum amount of response. P. Ghabezi, and M. Khoranb A [2] studied in their investigation the experiment is carried out to analyze two criterions of delamination and uncut fiber factors in the drilling of PVC foam composite sandwich panels. The effect of cutting speed, feed rate and tool diameter on the hole quality is analyzed. The mean values of DF and UCFF versus different cutting parameters for PVC core materials. R.M. Kulkarni [3] et al in their experimental studies of drilling of glass fibre reinforced plastic laminates dispersed with 0, 4 and 8 wt% carbon black employing a sensitive drilling machine were undertaken. Design of experiments provided an experimental plan of L27 orthogonal array by considering carbon black % weight, spindle speed, Feed rate, drill point angle and drill material as factors. J Baboo and Tom Sunny [4] has presented an application of the Taguchi method for the delamination study of drilling of GFRP composites. The analysis of experimental results is carried out using Taguchi's orthogonal array and analysis of variance. The level of the best of the cutting parameters on the drilling induced delamination is determined by using ANOVA. The drilling induced delamination increases with spindle speed (1000rpm-2500rpm) and decreases with feed rate (100mm/min to 400mm/min). The results for very low feed rate i.e., 50mm/min and high spindle speed 300rpm show the opposite trend. In both the cases delamination factor increased instead of decreasing. The reason for higher delamination at spindle speed 3000rpm may be, when the drill speed increases, the thrust force increases because severe heat generation in the drilling area leads to softening of the fiber and matrix. S. Madhavan and S. Balasivanadha

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Experimental investigation of honeycomb composite materials

N.Govinda Rao .[1], A.Srinivas [2]

ABSTRACT

The purpose of this study is to measure the impact of complex materials made of Kevlar29, Honeycomb Aluminium, and Carbon fibres at high velocities. These materials are also tested to determine their mechanical properties. Finally, high-impact loading tests utilising energy absorption were carried out experimentally using a gas gun device and impactors in the shape of flat cylindrical bullets. The failure of the projectiles' coupling mechanism was the topic of the discussion of the study's findings. The projectile's kinetic energy is influenced by the projectile's velocity and defamatory level. The projectile's speed is influenced by the target's thickness. The research done to connect the failure mechanisms with the projectile's loss of kinetic energy and its impact on ballistic maximum velocity is described in relation to the findings. The impact on the target thickness rate was then discussed. The loss of vitality was anticipated by supposing that the all-out effort put forth in the disfigurement of the plates would be similar to the complete loss of the shot's motor vitality. There was an association between the thickness of the composite material and the potential speed. The hypothetical results showed excellent comprehension when compared to the test results.

Keywords: Vegetation cover; GIS; RS; Agricuture; Evaluation

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1. Introduction

Several industries use honeycomb panels, because of their lightweight, high strength and light power consumption. Airplane industries often use honeycomb panels. The inner and outer body of a plane has been studied as of late Alavi et.al [1], which made of honeycomb and sandwiches under dynamic semi-static loading.

Essam [2] On the other hand, aluminum alloys have long been preferred for civil and military aircraft due to their having high strength/weight ratio (lightweight), excellent weldability, the low value of thermal expansion coefficient and excellent corrosion and abrasion resistance. Therefore, these properties of aluminum alloy attribute the rapid increase of using this alloy in automotive structural applications Essam [3].

The high-velocity impact produces a short duration, steeply rising loading pulse when impacting the structure. Due to a high strain frequency, it is regulated by electromagnetic factors, force transmission, and increases in structural rigidity, intensity, and fracturing strength. While such damage decreases the structure's load-bearing strength, its consequences can usually be predicted using the principles of fracture mechanics. At higher velocity, the mechanical object's reaction is controlled by the ma's specific actions., Enock et. al [4]. Abbud [5] introduced a new theoretical prediction model to fracture properties of dual-layered translucent plastic products whereby aluminum and compact steel conical tip bullets get an effect acceleration rate of 100–970 m / s. The energy has been assumed to become the loss of the velocity vector energy and also to be categorized into three forms *that contain* the work was bendable and it was petalled and the sandwich was achieved. They noted that perhaps the polymer objectives had shown their distinctive shape of inability comparable to the shape of inability which is identical to what has been recorded for dual-layer thin steel objectives.

DESIGN AND ANALYSIS OF AIRCRAFT STRUCTURE WINGS USING ALSTOM

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Abstract - *An aircraft's wings are structural components that are utilised to generate lift during takeoff. The initial assault angle of the wing is definite. Due to the pressure difference at the top and bottom surfaces of the wing, lift force is produced when the flow passes over it. This project's major goal is to determine which alloy, aluminium or titanium, is best for use in the construction of wings for subsonic flight. The wing is created using CATIA V5 R21, a solid modelling programme, and the analysis is carried out using the finite element method. To determine how much deformation, stress, and strain the wing has undergone, a static structural study of the wing is performed. The research in this paper takes into account the structure of an aeroplane wing, which consists of a skin, two spars, and ten ribs. Two spars travel longitudinally along the length of the wing, and the ribs run from the leading edge to the trailing edge. In summary, the recreation outcomes show that the arrangement is workable, and a comparison of the findings reveals that the titanium alloy offers greater flexural strength and mechanical qualities.*

Key Words: Structural Behaviour, Deformation, Stress, Strain, Aircraft Wing, ANSYS.

1. INTRODUCTION

The composition and manufacture of aircraft wings demand attention to several unique structural requirements. High strength and lightweight are the two primary functional needs to be considered in selecting materials for the construction of an aircraft wing. Different material used to manufacture wing will experience a different type of structural behaviors. As the chief assembly to generate lift, the lifting surface is the total critical share of an airplane. The wing not lone assures flying steadiness but also provides a facility to support the strategic operation unit. There are many types of wing aircraft, such as the conventional wing, delta wing, wings having sweep, dihedral wing, tapered wing, and flexible geometry wing, and each wing will produce different aerodynamic characteristics, stability, and maneuverability.

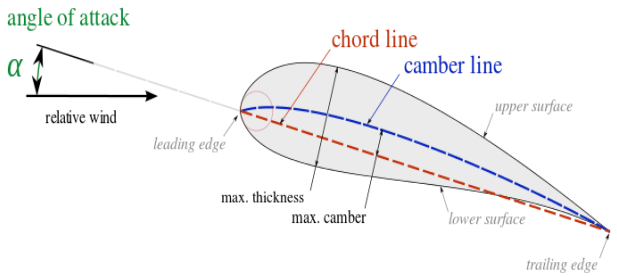
We know two basic methods of the modal analysis, namely the numerical modal analysis and the experimental modal analysis. The experimental modal analysis deals with measurements input data from which a mathematical model is derived. This paper is mainly concerned about numerical modal analysis. Wing construction is similar in most modern aircraft. In its simplest form, the wing is a framework made up of spars and ribs and covered with metal. Spars are attached to fuselage and the tip chord is free, hence aircraft wing is considered as a simple cantilever beam.

There will be several limitations and assumptions made throughout the analysis. Finally, the structural analysis of stress, strain, and deformation data of the wing is acquired from end to end transient structural analysis, which is smeared for optimization and improvement to the design of the aircraft for the future.

2. AIRFOIL TERMINOLOGY AND DEFINITIONS

2.1 AIRFOIL

In the airfoil profile, the forward point is called the leading edge and the rearward point is called the trailing edge. The straight line connecting the leading and trailing edges is called the chord line of the airfoil. The distance from the leading edge to the trailing edge measured along the chord line is designated as a chord (c). The mean camber line is the locus of points midway between the lower surface and upper surface when measured normal to the mean camber line itself. The camber is the maximum distance between the mean camber line and the chord line, measured normal to the chord line. The thickness is the distance between the upper and lower surfaces also measured normal to the chord line. The shape of the airfoil at the leading edge is usually circular, with a leading-edge radius of 0.02c, where c is the chord length. The upper and lower surfaces are also known as suction and pressure surface respectively.



2.2 AIRFOIL CLASSIFICATION

The Network of Aquaculture Centers in Asia-Pacific, airfoil series, the 4-digit, 5-digit, and the updated 4-/5- digit, were generated using analytical equations and analogies that described the curvature of the airfoil's mean-line (geometric

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Multi Stage Reliability Optimization Usingstochastic Dynamic Programming

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ABSTRACT- A new approach to Reliability is discussed in this paperand it is not the same in each and every product of the same variety of stochastic dynamic programming. Productreliability has tolerance limits of numerical value with certain randomness or with probability. Algorithms used inproblems pertaining to reliability are mainly stochastic or random in nature. To obtain the maximum system reliability different types of components for which reliability follows a random nature, a technique to solve such problem is required. The applicability of the proposed methodology for problems of stochastic nature has been converted into a problem of deterministic nature and the solution is found to be superior.
Key words : *dynamic programming, probability,reliability, stochastic.*

1.INTRODUCTION

Dynamic Programming is being used for the optimizing different types of problems of any nature. Dynamic Programming of the parameters in the return and state transformation functions are found to be in random naturerather than deterministic in nature. The detailed mathematical function is given by

First let us consider a stochastic return function

Qi = Si (ti+1, ui, ri)

Where ti+1 is the state variable of input at stage i, ui is decision variable and ri is variable which is random in nature. Let the random variable ri be discrete with a probability function of pi(ri). For a fixed value of si+1 and ui, we would expect to receive on an average return of

Qi = Si (ti+1, ui) = □pi(ri).Si (ti+1, ui, ri)

Where, summation extends for all of the values 'ri'. Alternatively, if 'ri' is continuous random variable with a pdf of fi(ri), expected return value is given as

Si (ti+1, ui)= □ fi (ri) Si (ti+1, ui, ri)dri

Performance of Heat exchanger WITH U Bent tube Using CFD

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Abstract

The performance of three heat exchanger units (2-E-2301, 3-E-901, and 3-E-401) in a polyethylene plant is assessed in this research. In order to determine the overall heat transfer coefficient, heat duty, temperature and pressure range of hot and cold fluids, capacity ratio, and effectiveness, steady state monitoring and direct data collection from the plant's equipment were carried out. The data were then analysed using energy equations. The findings indicate that for 2-E-2301, both the heat duty and the overall heat transfer coefficient are more than 75 percent higher than the design figure. The 3-E-901's heat duty and overall heat transfer are more than 75% lower than the intended value, which can be attributed to fouling. This had an impact on the hot and cold fluid's efficiency, capacity ratio, and temperature range. The 3-E-401's heat duty was discovered to be within the design figure's maximum. Both the capacity ratio and the temperature difference on the hot fluid side fell within the design figure's tolerances. As a result, the results demonstrate a qualitative assessment of the heat exchangers' performance.

Keywords: heat-exchanger, heat, performance, energy

1. Introduction

Heat exchangers are equipments that transfers heat from one medium to another. It is a device in which energy is transferred from one fluid to another across a solid surface. It is used where high temperature and pressure demand are significant and can be employed for a process requiring large quantities of fluid to be heated or cooled [1]. Many types of heat exchangers have been developed to meet the widely varying application, based on operating principles, arrangement of flow path and design constructional features. The process of heat exchange between two fluids that are at different temperatures and separated by a solid wall occurs in many engineering applications such as in a polyethylene plant. The device used to implement this exchange is called a heat exchanger, and specific applications may be found in space heating and air-conditioning, power production, oil distillation, waste heat recovery and chemical processing [2]. In a polyethylene plant, the heat exchangers allow heat energy in the plant to be passed from one process fluid to another in a controlled manner. It is also used for temperature profile control as well as steam generation and phase separation.

Heat exchangers are typically classified according to flow arrangement and type of construction. In the first classification, flow can be counter-current or co-current (also called parallel). On the other hand, according to their configuration, heat exchangers can be labeled as tabular, plate and shell-and-tube heat exchangers. In recent years, several performance evaluation methods and studies have been developed and employed to evaluate and improve the performance of heat exchangers. Such includes enhanced surfaces which can be divided into both passive and active method. Passive

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Optimization of Milling Parameters On Carbon Fiber Reinforced Polymer Composite Using AI

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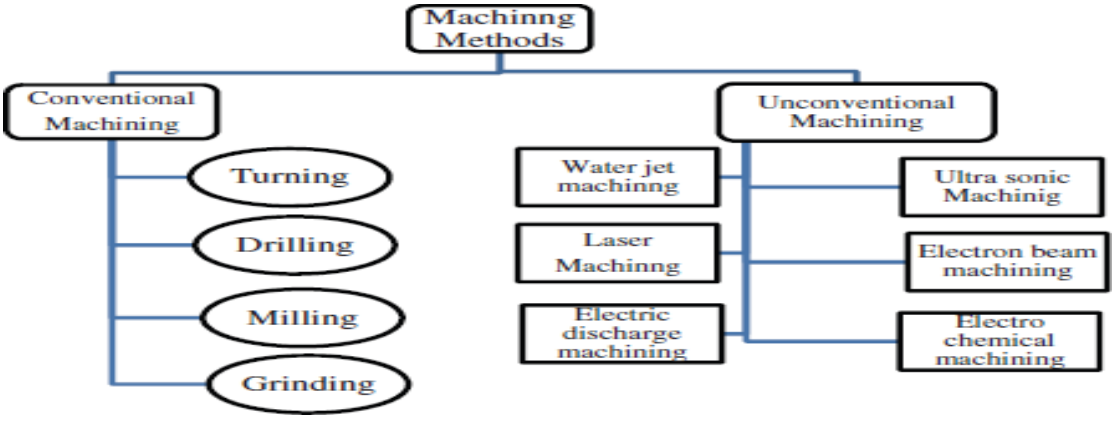
Abstract

Applications requiring precise motion transmission and quiet rotation use glass fibre reinforced polymer (GFRP) composite gear. The quality of the apparatus must be raised in order to expand its use. In order to determine the important impact of the parameters on the test's quality features, an analysis was conducted to evaluate the affects of the machining factors on the replies. A level of confidence of 95% was assumed when this analysis was conducted with a level of significance of 5%. Surface abrasion ANOVA outcome It is found that the factor with the biggest impact on the machining force is the cutting tool (P=0.003) (47.73 percent). Spindle velocity (P=0.048) (18.30 percent), The next two most important factors were feed rate (0.098) (13.30 percent) and depth of cut (0.136) (11.27 percent). Surface roughness plays a vital role in the study's parameters.

Keywords- GFRP, ANOVA, Surface Roughness, glass fibre , composite

1.1 INTRODUCTION:

The GRA-based Taguchi optimization technique with experimental design aids in the control/reduction of various errors during the fabrication of GFRP composite gear.(3) The response table was used to select various parameters for ranking. The p-value is less than 0.02 and thus all process parameters have a significant effect on the performance characteristics of GFRP. Rotary feed, cutting speed, cutting fluid ratio, and cutting fluid flow rate have been identified as key significant parameters of the gear shaper machine that control performance characteristics. The optimum machining parameters are 0.15 mm/stroke rotary feed, 240 strokes/min cutting speed, 12% cutting fluid ratio, and 30 ml/min cutting fluid flow rate. The significant parameters that influence performance characteristics have a 96% confidence level. According to a review of the existing literature, many studies have been conducted on polymer composite gears performance based on milling machine by varying reinforcement, process routes, and gear pair combinations of different materials, but no study is available on single optimization of milling machine cutting parameters for minimum variation/deviation of surface roughness of tooth, which affects noise, vibration, and load carrying capacity. The variation in root diameter affects the root fillet radius, which is responsible for tooth beam strength; the variation in tooth thickness controls the proper meshing of teeth, which is responsible for noise and vibration; and the variation in surface roughness affects the friction and life of teeth in wear.



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Original Article

FLEXURAL PROPERTIES & FRACTOGRAPHY ANALYSIS OF SANDWICH STRUCTURES AA/GF COMPOSITES

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ABSTRACT

The Flexural properties and Fractional analysis of AA/GF composites were studied. The effect of treatment of AA/GF/composites was also studied. It was observed that Flexural properties of composites increase with Multi-walled Carbon Nano Tubes (MWCNT) used as Nano filler that is dispersed with the Epoxy resin at different percentage of weight like-3%, 4% and 5%. The fabrication of samples is done with the help of hand layup technique which is a cost effective method. Micro characterization of sandwich structure is done with the help of flexural test. Later the formability parameters and flexural properties are determined from the test performed. Finally, micro structural characterization is done with the help is fractography analysis using Scanning Electron Microscope (SEM).

KEYWORDS: Epoxy resin, Formability, MWCNT, Sandwich structure & SEM

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1. INTRODUCTION

Sandwich materials are an emerging section under very broadly classified composite materials. It is mainly because Fiber-Metal Laminates (FMLs) are lightweight hybrid composite materials that consist of metal layers on both exterior sides of structure that possesses a non-metal layer in its core with adhesive to simply bind the layers intact [1].

In this research work, the Aluminium alloy of 5xxx series is used as a skin material and electrical grade Glass fibre as a core material. This metal and non-metal layers are combined using Epoxy resin as an adhesive with the reinforcement provided by nano filler i.e., Multi Walled Carbon Nano Tubes (MWCNT) [7]. The Sandwich